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HARVARD
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SCHEDOPHILUS PEMARCO, WITH NOTES
ON ITS BIOLOGY¹Richard L. Haedrich² and Fernando Cervigón³

ABSTRACT. *Schedophilus pamarco* is a non-schooling, somewhat rare fish that occurs along the West African coast from 19°N to 17°S on the bottom at depths of 50-250 m. In two different years, a solitary specimen has been taken in the southeast Caribbean; these specimens were probably wafted from West Africa via the North Equatorial Current. *S. pamarco* can be distinguished from other *Schedophilus* by the anal count of III 16-19 and the irregular horizontal stripes on the sides. Allometry is not particularly marked between 80 and 240 mm SL. Fishes of 200 mm SL could be sexed, but were immature. Food items may include jellyfish, hyperiid amphipods, euphausiids, and small fish.

Schedophilus pamarco (Poll, 1959) is a near-shore fish of the tropical coast of West Africa. The type material, comprising four specimens, was from near the mouth of the Congo River (ca. 6°S) and from near Porto Amboin (ca. 11°S). Blache (1962) reported the species from the Gulf of Guinea, but gave no particulars as to the specimens on which the report was based. During the Guinean Trawling Survey (GTS), at least 14 more specimens were taken from off the mouth of the Kunene River (ca. 17°S) to Sierra Leone (ca. 8°N). This series and additional specimens from the "Walther Herwig" give a better impression of the species' distribution, and provide some information on the allometric growth and food habits of *Schedophilus pamarco*.

Although essentially a fish of the eastern tropical Atlantic,

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Schedophilus pamarco can range far from this area. This note reports two specimens, caught in different years, from off Venezuela in the southeastern Caribbean Sea.

Schedophilus pamarco (Fig. 1) is one of the most easily distinguished members of the genus. The low anal finray count (III 16-19) is the best diagnostic character. All other *Schedophilus* have at least 20 anal finrays, and one has as many as 40. The pattern of thin irregular horizontal stripes on the sides is another good distinguishing feature. Only *S. griseolineatus* (Norman) has a similar pattern, but this western South Atlantic species has 31-33 dorsal finrays in comparison to the 23-26 found in *S. pamarco*.

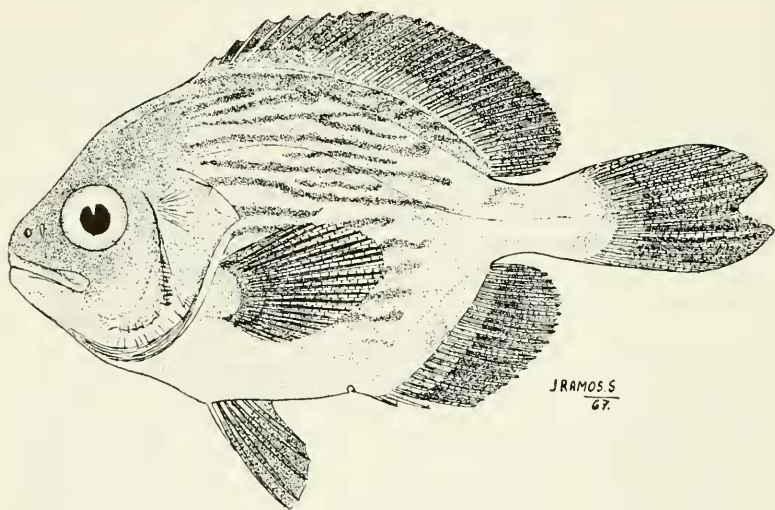


Fig. 1. *Schedophilus pamarco* (Poll), an 89-mm specimen from the Caribbean, 10°53.5'N 61°00.6'W. Museum of Comparative Zoology specimen.

Figure 2 shows the extent of allometric growth in *Schedophilus pamarco*. It is nowhere particularly marked, and, by the time the fish has reached a length of approximately 200 mm SL, the relative proportions are more or less stabilized and no longer change with growth. This is very generally the case in stromateoids, the most dramatic changes occurring early. In *S. medusophagus* (Cocco), for example, the greatest changes take place between 10 and 80 mm SL (Haedrich 1967: 47). Clearly, smaller specimens of *S. pamarco*, when found, may be expected to differ morphometrically from the ranges displayed by the larger specimens here reported.

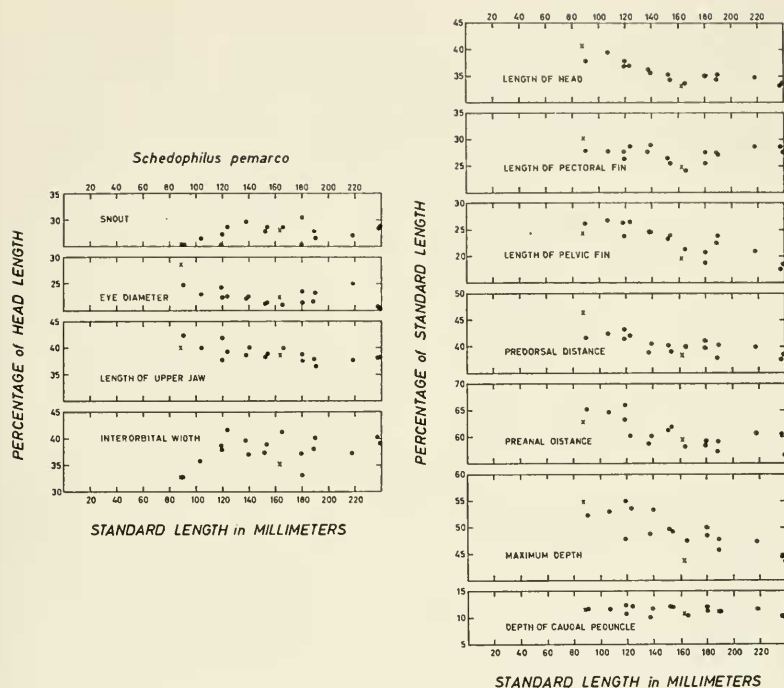


Fig. 2. Scatter diagram of the allometric growth in *Schedophilus pamarco*.

● West African, x Caribbean.

The leveling off of the allometric growth curve may correspond approximately to the onset of maturity. Specimens of 200 mm SL could be sexed, though the gonads even in these were quite small and poorly developed. None of the specimens examined were mature. It is not likely that the failure to find fully developed gonads is merely a function of time of the year, since specimens in the material studied came from both spring and fall.

Stomachs were often empty. The most common food item encountered was the amorphous, soupy remains of jellyfish. In two stomachs, there were hyperiid amphipods about 5 mm long. Euphausiid remains were found on one occasion, and, in the stomach of a 152-mm fish, there was a 60-mm carangid fish, probably *Trachurus*.

All specimens were taken in bottom trawls. Figure 3 shows the depth of water in which each specimen was taken. Most of the catches (>60%) occurred in water shallower than 55 m. Plotted

against depth-of-capture in Figure 3 is the size of each specimen. The plot suggests that as *Schedophilus pamarco* grows larger, it seeks deeper water. All the specimens larger than 200 mm SL were taken at depths of 150 m or greater. This pattern of behavior is very commonly seen in the stromateoids, although in most cases the smaller fishes are pelagic, not bottom-living.

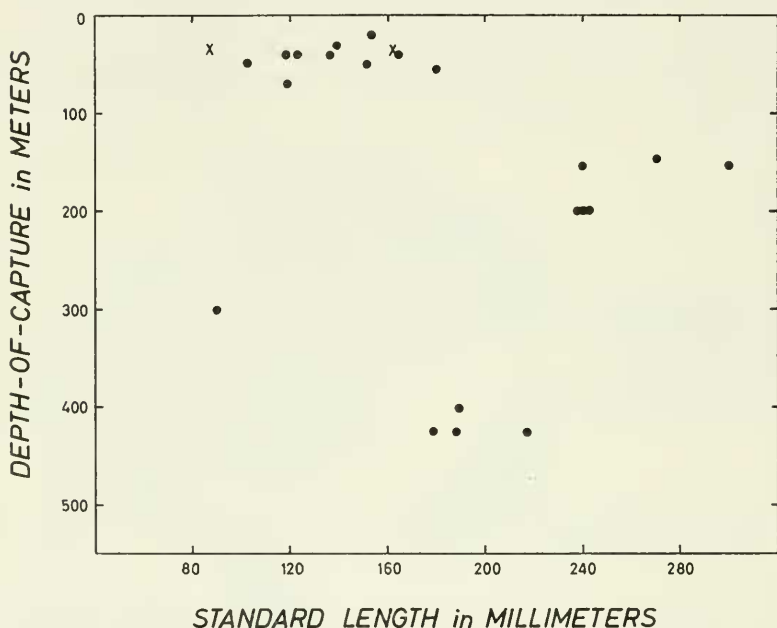


Fig. 3. Depth distribution of *Schedophilus pamarco*. Each point represents one specimen. All data from bottom trawls; when a depth range is indicated, only the mid-point is plotted. ● West African, x Caribbean.

The bottom trawls used were of various sizes. The smallest was about 10 m across, the largest about 45 m. Those used by GTS were roughly 25 m. Despite these large trawls, most catches (>80%) were of single fish. The greatest number from any one trawl was three. *Schedophilus pamarco* is thus probably a non-schooling, somewhat rare, fish. The species was, for example, not abundant enough to enter into the analysis of species assemblages based on the 480 trawls of the GTS survey (Fager and Longhurst, 1968).

Figure 4 shows the horizontal distribution of *Schedophilus pamarco*. One of the northernmost records, at about 19°N, is from Cervigón (1960:69,74), where the fish was referred to as *Mupus* sp. aff. *M. ovalis*. The records along the African coast fall effectively within the 75°F isotherm of Hutchins and Scharff (1947). Outside this region, the surface temperature is always colder than 75°F (24°C). Seasonal cooling, of course, reduces the surface temperature somewhat on each end of this distribution, but, for the most part, the temperature is always warmer than 18°C (Hutchins and Scharff, 1947). The 200-m temperature across this region, more or less stable the year around, ranges from about 10° to 15°C (Sverdrup *et al.*, 1942).

The two records of *Schedophilus pamarco* from the Caribbean, reported here for the first time, are of some interest. There can be no doubt as to the identification. The two fish almost certainly originated in Africa, and it is not hard to imagine the pathway that could be used, although the time needed seems somewhat long. Unpublished drift bottle data on file at the Woods Hole Oceanographic Institution suggests that the journey from the Mauretanian region to northeastern South America or the Lesser Antilles via the North Equatorial Current would take something of the order of six months. The Caribbean specimen illustrated in Figure 1 is one of the smallest *S. pamarco* known. Smaller specimens, as in

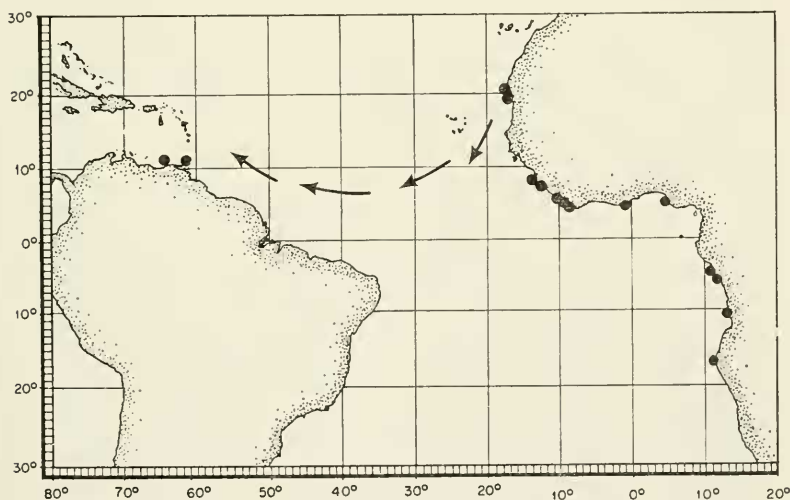


Fig 4. Geographical distribution of *Schedophilus pamarco*. The arrows indicate the general path of the North Equatorial Current.

other *Schedophilus*, may be pelagic and may associate with floating objects. If this is the case, as is likely, these fish would be prime candidates for transport.

Schedophilus pamarco does not seem to have established populations in the New World. It was not encountered, for example, in the extensive trawl surveys conducted during 1957-1959 on the continental shelf of British Guiana (Lowe, 1962), and continuous surveys both off the Guianas and in the southeastern Caribbean by Venezuela during 1962-1968 have taken only the specimens recorded here. Nonetheless, the taking of two specimens in each of two different years indicates that immigration from West Africa may occur with some regularity.

Transport and establishment are, of course, two quite different things. In comparison to the West African shore fish fauna, the fauna of the New World tropics is very rich indeed, and, in such a situation, one would expect the successful colonists to move from west to east. The data support this expectation. Briggs (1967) finds that no essentially West African fishes have been successful in crossing the Atlantic, but that over 100 species have established themselves in the opposite direction. Movement from west to east need not be an upstream movement, for there are zoogeographically important countercurrents in the equatorial region (Scheltema, 1968).

Description. *Schedophilus pamarco* is a deep-bodied, rather firm-fleshed fish. The profile of the head slopes steeply to the blunt snout. The head and nape lack scales. The preopercle is beset with 12-19 prominent spines. The large eye is centrally located, roughly one-half its diameter or more below the dorsal profile. The large mouth is inclined somewhat downward; the end of the maxilla extends to under the center of the eye or beyond. The pectoral fin is broad and rounded. The pelvic fins, inserted directly below the pectorals, are long and often reach beyond the anus. The color in preservative is grayish brown, with blue-gray-tinged horizontal lines running all along the sides. The fins are gray or blackish, darker than the body. The pelvics are particularly black. The head is uniformly dark with very dark, thin opercles, and the eye is bluish. In the summary of meristics which follows, the two numbers in parentheses are the figures for the two Caribbean specimens 88 and 162 mm SL respectively: in % SL — head 33-41 (41, 33), pectoral length 24-31 (30, 24), pelvic length 18-27 (24, 20), predorsal distance 38-47 (47, 38), preanal distance 57-66 (63, 60), maximum depth 43-55 (55, 44), least depth caudal peduncle 10-13 (12, 11); in % of head — snout 25-30

(26, 28), eye diameter 21-29 (29, 23), length upper jaw 39-43 (40, 39), interorbital width 32-42 (33, 35); counts — dorsal V-VII 23-26 (VI 24, VI 24), anal III 16-19 (III 16, III 17), pectoral 19-22 (21, 20), gill-rakers 5-7 + 1 + 13-16, most commonly 7 + 1 + 15 (7 + 1 + 15, 7 + 1 + 15), vertebrae always 10 + 15. Count frequencies for fin elements are given in Table 1.

Table 1. Count frequencies of fin elements in *Schedophilus pamarco*.
Anal spines are III.

Dorsal spines	V	VI	VII	
Number of specimens	5	11	2	
Dorsal finrays	23	24	25	26
Number of specimens	3	12	3	1
Anal finrays	16	17	18	19
Number of specimens	1	11	7	1
Pectoral finrays	19	20	21	22
Number of specimens	1	7	11	1

Specimens used in this study, unless otherwise noted, are deposited in the Museum of Comparative Zoology, Harvard. Disposition of the others is in the Institut für Seefischerei, Hamburg (ISH); Museu de Historia Natural La Salle, Caracas (MHNC); or Tropical Atlantic Biological Laboratory, Bureau of Commercial Fisheries, Miami (TABL). Material examined: GTS — 1 spec. 90 mm SL, Geronimo 2-246, 9 Sept 63, 4°31'S 10°53'E, 300 m (TABL); 1 spec. 153 mm SL, Thierry 1-2, 21 Sept 63, 5°06'N 1°05'W, 20 m; 1 spec. 152 mm SL, La Rafale 18-4, 30 Oct 63, 4°35'N 8°25.5'W, 50 m; 1 spec. 189 mm SL, La Rafale 16-8, 4 Nov 63, 5°17'N 9°55'W, 400 m; 1 spec. 139 mm SL, La Rafale 15-2, 5 Nov 63, 5°55.5'N 10°12'W, 30 m; 1 spec. 119 mm SL, La Rafale 11-3, 15 Nov 63, 7°18.5'N 12°41'W, 40 m; 3 spec. 188-217 mm SL, La Rafale 11-8, 16 Nov 63, 7°12'N 12°46'W, 350-500 m; 3 spec. 123-165 mm SL, La Rafale 10-3, 17 Nov 63, 7°32'N 13°21'W, 40 m; 1 spec. 103 mm SL, La Rafale 9-4, 19 Nov 63, 7°53'N 13°58'W, 50 m; 1 spec. 119 mm SL, Thierry 5, 31 Mar 64, 5°13'N 4°56'E, 70 m. Other West African — 3 spec. 237-242 mm SL, Walther Herwig 143/164, 20°31'N 17°42'W, 200 m (ISH); 1 spec. 180 mm SL, Undaunted 68-262, 24 Mar 68, 17°02'S 11°40'E, 55 m, 40' trawl (TABL). Caribbean — 1 spec. 88 mm SL, 31 July 67, 10°53.5'N 61°00.6'W, 32-38 m; 1 spec. 162 mm SL, 7 Apr 68, 10°51'N 64°11'W, 33 m (MHNC).

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